Autonomous Army robot with Geo-fencing technology

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Abstract: Government is allocating many expenses made in the field of military and army forces in adopting primitive security measures taken to protect the borders from the unknowns and tresspassers. And some military/army organizations taking the help of robotics and technology and in the risk pronezone areas which are not that effective when its done by miltary mens. These Army robotics are comfine with the camera module, sensors, bomb detector and video streaming. The main agenda of our system is to get chameleons or camouflaged including some additional parameters like bluetooth model for real time data processed by the camera at the video screen and passive infrared sensor to identify the intruders.. Thus the proposed method using blue-tooth reduces errors at defense and keeps the nation secure from the foe.

Keywords: controller, wifi module, motors, chassis, camera module,wifi night vision camera module, etc.

I. INTRODUCTION

The motive behind Autonomous Army Robotic is to downgrade human losses in army operations or enemies attacks. Autonomous Army Robotic acts as a spy and it can be sent into the planned locations of miltary importance for observation and warfare purpose. Since it's very hard to detect it by a naked human eye, the Autonomous Army Robot is also used to calculate the various certainity systems developed in the market and act as a measure to evaluate its efficiency. The idea of the CSR   is based on the chameleon's techniques. The aim of the project is to assemble, design and operate a robot via desktop, used as remote control device, a smart phone robot which can duplicate the colors where it moves on, hence being camoflaged to the outside part of world. To achieve these goals, we have used a light emmiting diode matrix (RedGreenBlue) which can diffuse uniform colors. Initially, robotic module can camouflage itself in three colours i.e red, green and blue color.

  Army Robotic is capable to perform tasks such as locomotion, sensing the dangerous gas, sense the humans beneath the surface, bomb detection. military robotic is an Autonomous robot encompasses of wireless camera module which can be used as a spy and Bluetooth used to control it with wireless.

Geofencing technology applied and find the enemies zones gives the warning with alarm system and notify to the robot control station, geo fencing is using based on gps module interfaced with microcontrollers. The human lifes are comes to risk in the places where the human being cannot survive, extreme weather conditions, high altitude areas, war fields etc. and the human's life are always prior than anything else, the proposed robot is substitution to human life where in it acts as a security. The robotic vehicle is a mechanical device that resembles a human or an animal. These army robotic machineries are guided by the computer programming and electronic circuitry. These army robutic models can replace humans in performing repetitive and dangerous tasks. Basically military robotics models are competent of performing the tasks such as movement or locomotion, gives the information about climatic weather conditions, sensing of human or animal movement, sensing the harmful gas, metal detection, capturing the images. The overall proposed work analyzes the surrounding area and provides the live footage to the observer or the user using the wireless camera. These are virtual spy and can be sent into the startegic or repetitive locations of army importance for defence purpose. This robotic models with geofencing can be controlled from the remote location.

II . Ease of Use

 The camouflage surveillance robotic (CSR) are to minimize the human losses in the defence operation or enemies attacks. This CSR acts as a virtual spy and can be sent into the planned location of Army importance for observation and defense purpose. As the name itself says camouflage it is very hard to detect the robot by a bare human eye. The objectives of the CSR is based on the chameleon's method. The main aim of our project is to operate and control a robotic vehicle that can be remote based control, this mobile robot can duplicate the color where it moves on, hence being with camoflaged to the outside world. To achieve this we used red, green and blue (RGB) LED matrix which can diffuse uniform color.In this project beginning with the robotic model can be camouflage

III. RELATED WORK

Most of the military organization now takes the help of robots to carry out many risky jobs that cannot be done by the soldier. These robots used in military are usually employed with the integrated system, including video screens, sensors, gripper and cameras. The military robots also have different shapes according to the purposes of each robot. Here the new system is proposed with the help of low power Zigbee wireless sensor network to trace out the intruders (unknown persons) and the robot will take the necessary action automatically. Thus the proposed system, an Intelligent Unmanned Robot (IUR) using Zigbee saves human live and reduces manual error in defense side.

we are going to study about military robot. Most of the military organization now takes the help of robots to carry out many risky tasks that cannot be done with the help of the soldier. These robots used in military application are usually employed with the integrated system, including video screens, sensors and cameras. A robot is basically an electro-mechanical machine which is guided by computer and electronic programming. Many robots have been built for manufacturing application and can be found in factories around the world. In most of the recent up-set ROBOT which can be controlling utilizing by an APP for android versatile. We are developing the remote buttons in the app by which we can control the robot motion with them. We use Bluetooth communication to interface controller and android. Controller can be interfaced using the Bluetooth module though UART protocol. According to commands received from android the robot motion can be controlled. The correspondent output of a robotic system along with quality and repeatability are unmatched. It also has the ability to re-establish contact with main station if any movement or position is tracking .The robot can silently enter into an enemy area and send us all the information through its camera eyes and also through GPS & GSM. Wireless cameras will send back real time video inputs which can be seen on a remote monitor in the base station with the help of computer & the robot is being controlled and necessary actions can be taken accordingly.

IV. PROPOSED WORK

In order to resolve the problems of existing work we proposed the new approach. Theidea of our project is based on the camouflage technique, and to use IoT technology for the communication. The main objective of our project is to design and operate a robot which can be controlled from the remote locations using IoT technology; this small portable robot can duplicate the color where ever it moves, so that it will hide to the outside world. There are three LEDs i.e RGB LED matrix which can reflect uniform color. In this project, the robot can hide itself based on red, green and blue color. simultaneously we can establish a connections which can receive, and display information received by the smart phone using IoT technology and also the motors connected to the wheel of the CSR which can make movement of the robotic vehicle in any required direction. This proposed work will solve the problem of communication and the problem of getting damaged

V METHODOLOGY

NODMCU (ESP32) microcontroller is the main part of this system having builtin WiFi module used to connect with the internet through which it is used to connect to the Blynk cloud, the sensors like ultra-sonic module is used to find the obstacles, and colour sensor capable of measuring red, green, blue colors used and to detection of the colour of main surface of the land by using this information about the colour the corresponding RGB color will be glow in the RGB matrix which are covered over the body of the robotic model and the passive infrared (PIR) sensor gives information using fresnel lenses when any warm body like human or animals passes by, metal detector is used to detect the metallic devices such as bombs, guns etc., MQ –7 gas sensor modules is used to detect the very harmful gases mainly into hydrogen gas, library based DHT11 sensor used to get the information about the weather like temperature and humidity readings, the rain drop sensor used to get the information that whether it is raining or not. All these sensors are mounted on the robotic vehicle with proper supply. This robotic model is having four wheels which are connected to DC motors; these DC motors are driven by the motor driver circuit module and 1 a night vision WiFi camera i.e v380s module used for capture the live footage of the area, since it is having a special feature of night vision it can also capture the image even in the dark condition. The power supply required for the controlling motor driver module is 12V and for a nodemcu esp32 and all sensors require 5V of power supply, from the single 12V battery supply a DC to DC converter (LM 2596) is used to convert 12V i/p power supply to 5V output power supply for the sensors and nodemcu esp32 module
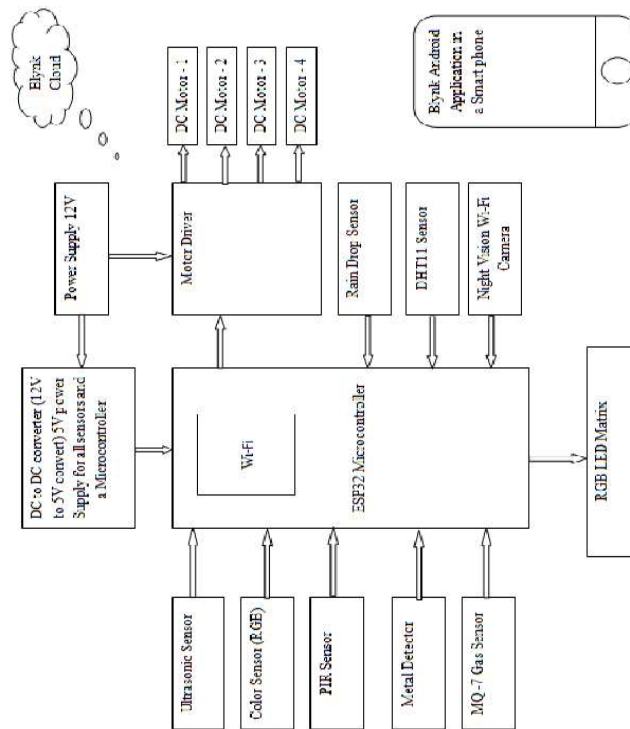
The information from the sensors are send to the microcontroller, this microcontroller nodemcu ESP32 is having builtin WiFi module and it is connected to the preprogrammed router or the mobile internet hotspot to get the internet connectivity so that to establish a communication between the Blynk android app and the robotic model. In the smart phone the Blynk application has to be installed and should be signup and login to particular user by giving correct username and password. Once the connection is established between the robotic model the Blynk cloud and the Blynk android app in the smart phone the movement of the robot can be controlled remotely by adding suitable buttons widgets for forward backward, right and left movement of the robotic model, and also all sensor values or the information will be uploaded to the server and the same can be viewed on the android application

VI SYSTEM OVERVIEW

The diagram shows that overall architectural diagram of the system design, here we have used ESP32 or node MCU microcontroller and all the sensors like ultrasonic sensor, color sensor, PIR sensor, metal detector, MQ-7 sensor, raindrop sensor, RGB LED matrix,

DHT11 sensor are connected to the microcontroller and the microcontroller is interfaced with cloud server
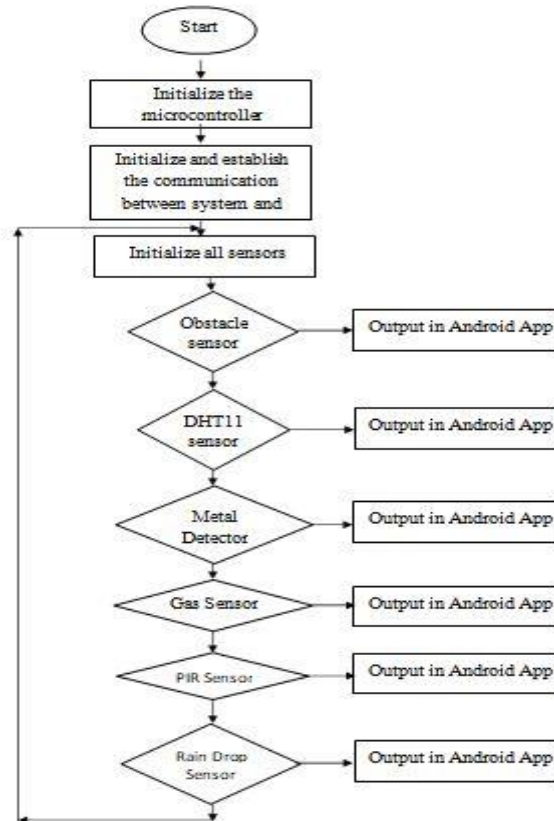
Fig : Data flow diagram

It's a graphical representation of data flow between the modules and the information and also it models the process aspects. DFD is used to create overview of the system. DFD can also be used for the visualizing the process of data. DFD will gives the input and output information to and from the system where the data will flow through the system, and where this data stored.

NODEMCU ESP-32 MODULE:
NODEMCU ESP-32 microcontroller is a less expensive device, low power consumption SOP micro controller with inbuilt wifi and a dual mode blue-tooth. This ESP-32 microcontroller it's developed by Espressif Systems

In our project it requires more number of input output pins because we used more number of sensors and actuators so we use ESP32 microcontroller and also it has inbuilt Wi-Fi this reduces our effort in interfacing the external Wi-Fi module.

Ultrasonic sensor
Ultra sonic sensor is an electronic device which will calculate the distance between the object by using ultra sonic module. It will measures distance by emitting out an ultra-sonic sound wave at a specific frequency and it will wait for that s i g n a l to reflect back. By setting the time between the emitted and reflected ultra sonic sound waves we can calculate the distance between sensor component and the object

Color Sensor

The dominant part in the color sensor is TCS3200 IC. This TCS32OO IC convertsthe light in to a frequency. To detect the color of the object correctly proper lighting is required so, four white color LED's are used
This color sensor module has 4 diodes covered by 4 different types of filter. It has an array of 8 X 8 photodiodes, in that

16
photodiodes are having red filters, six teen diodes having green filter, sixteen photodiodes are having blue filters and remaining sixteen photo diodes doesn't have any filters.

PIR Sensor

The   PIR sensor is a less cost sensor which can detect the presence of animals or human beings. Passive infrared sensor has three output pins.

MQ–7 module

MQ – 7 Chemiresistors is a low cost and can detect the gasses like hydrogen gas, carbon Monoxide. By using this sensor in our project we can detect the gasses that are released due to the explosion of bomb

Rain Drop Sensor

It is used to detect the rain in the automobile sector to control the wipers automatically; it canalso be used to sense rain in agriculture sector and other applications.

DHT11 Sensor

The Digital sensor (DHT11) module one of the less expensive digital temp and hum sensors. This sensor module can be easily interfaced with any microcontroller such as UNO, Node MCU, etc. to get instant humidity and temperature.
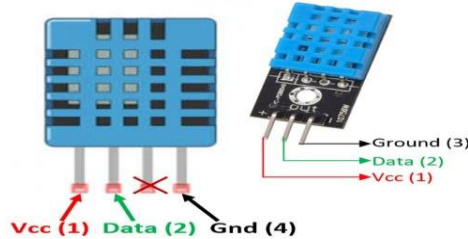
Motor Driver module

Motor driver module having L293D H-bridge motor driver module. These motor driver boards are acts as amplifiers because, they take to consume the low current input signal and provide a high current output signal; this high current output   is used to drive DC motors.

Fig : L293D Integrated Chip(IC) has driver circuit.

Night Vision wireless fidelity Camera

Night vision Wi-Fi camera is a new generation intelligent camera; it is integrated with remote configuration camera, remote viewing, and remote playback. It has a fixed 3.6mm HD lens with 720P or 960P resolution, so that we can have a clear image monitoring. To use it we have to download the V380 app in app store or Google play

DC Motor

we used motor for the movement of wheels in the robotic vehicle these DC motors are connected to the microcontroller through the driver circuit and the DC motor that is the wheels of the robotic vehicle is controlled by the Blynk android application.   working of the DC motors is that when a current carrying conductor is place in a magnetic field the conductor experiences a torque and has a tendency to move this is called a motion action thatis it produces a mechanical force

RGB LED Matrix

Red Green Blue Light Emitting Diode (LED) strip or LED tape is a flexible circuit board made of SMD LEDs and some other components that usually comes with a sticky backing. To powering the LED we should use 5V power supply. At 5V of power supply each LED in a strip draws about 50mA, when it is set to its full brightness

GPS Module

It is global postioning satellite system that gives the geo-location and time and latitude and longitude to a global positioning system receiver anywhere on earth where there is an unobstructed line of sight to four or more satellites. Global positioning modul operates independently of any of these it may be telephonic or internet receiver mode, though these technologies can enhance the usefulness of the globle positioning information.

ARDUINO IDE

Arduino IDE is used for programming the ESP32 microcontroller. Arduino software programming is free version platform. It is very easy to use, simple & clear programming environment

Embedded C

Programming embedded devices is different. It is not like developing the desktop applications or software applications on a desktop computer. Compared to PCs the characteristics of an embedded system. Embedded devices have limited Read only memory, Random access memory, stacks space & processing power is less. The components used in the desktop computer or PCs and in embedded devices are different; embedded system components are less power consuming components

VII RESULTS AND DISCUSSION

First step is to connect power supply for the robot, once the robot is powered up then make sure that it establishes a connection with the mobile router or to the smart phone hotspot. If it is connected then the name of the microcontroller will be shown as connected as shown in the below smart phone
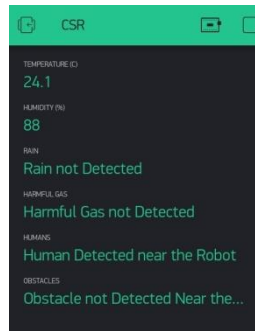

Fig: robotic model front view

Fig: blynk app

Fig: robotic model top view

CONCLUSION

The aim and objectives of the model is to provide security to the border for soldiers by implementing camouflage technology and to control the robot from the remote place wirelessly it has been auspiciouly accomplished using Internet based technology driven by Android App. We used infrared module to detect any hot bodies moving that may be men or any animals, ultrasonic sensor in order to detect the any obstacle in front of the robotic vehicle, DHT11 sensor and raindrop sensor to monitor the weather, metal detector to detect the metallic objects like bomb, gun etc., MQ gas sensors to sense always the harmful gases if any and we used a night vision WiFi remotely rotatable camera to get the live footage from the border to the official area. And thus by using this robotic model it is possible to provide 24 hours security

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